Pls Ex. 14
(PCCX621 - Rodney D. Fort, Sports Economics (Prentice Hall 3rd ed. 2011))

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Sports Economics

THIRD EDITION

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Library of Congress Cataloging-in-Publication Data

Fort, Rodney D.
Sports economics / Rodney Fort.—3rd ed.
p. cm.
Includes bibliographical references and index.
ISBN-13: 978-0-13-606602-6 (alk. paper)
ISBN-10: 0-13-606602-x (alk. paper)
1. Sports—Economic aspects—United States. 2. Professional sports—Economic aspects—United States. 3. College sports—Economic aspects—United States. I. Title.
GV716.F68 2011
338.4'77960973—dc22

2010019675

Prentice Hall
is an imprint of

PEARSON

www.pearsonhighered.com

ISBN-10: 0-13-606602-x
ISBN-13: 978-0-13-606602-6

Brief Contents

Did You Know?
Former heavyweight champion George Foreman signed a five-year, $137.5-million endorsement contract with Salton grills. On average, that's $27.5 million a year.

10 times their sports earnings through endorsements. Skater Michelle Kwan quintupled her income, and tennis players Serena Williams and Martina Hingis added four times their sports earnings with endorsements.

Comparisons with Other Entertainers

Even though these figures seem astronomical, when you look at Table 7.3, which lists the *Forbes* top celebrity and sports star earnings of 2008, with the exception of Tiger Woods, sports superstars do not reach the lofty compensation heights enjoyed by other entertainment superstars. Even though active athletes make the list, only Tiger Woods makes the top 10, but even he earned only about half of what *Harry Potter* magnate J.K. Rowling earned in 2008. For a final bit of perspective, in 2008 the entire New York Yankees team, the highest-paid team in all of sports, earned $209 million, about 70 percent of

Table 7.3
Celebrity Pay, 2008

Name	Pay ($Millions)	Pay Rank
J.K. Rowling	300	1
Oprah Winfrey	275	2
50 Cent	150	3
Jerry Bruckheimer	145	4
Steven Spielberg	130	5
Tyler Perry	125	6
Tiger Woods	115	7
The Police	115	7
Jerry Seinfeld	85	9
Jay-Z	82	10
David Beckham	50	16
Phil Mickelson	45	20
Kimi Raikkonen	44	26
Kobe Bryant	39	33
LeBron James	38	33
Ronaldinho	37	36
Roger Federer	35	37
Alex Rodriguez	34	41
Fernando Alonso	33	42
Jeff Gordon	32	44
Shaquille O'Neal	32	44
Dale Earnhardt Jr.	31	48
Kevin Garnett	29	52
Maria Sharapova	26	56
Serena Williams	14	73
Justine Henin	12.5	82
Annika Sorenstam	11	86
Lorena Ochoa	10	87
Vanessa Williams	4.5	98

Source: Excerpted and reordered by pay from Forbes Celebrity 100, forbes.com, July 3, 2008.

Did You Know?
In 2008, the entire New York Yankees team made about 30 percent less than *Harry Potter* magnate J.K. Rowling.

J.K. Rowling's earnings for that year. Even though sports superstars are paid handsomely, they are not even in the same league with other entertainment superstars, generally speaking.

Enough said about the impressive earnings of sports stars. What is the answer to the first question: How can athletes be worth so much? There are a few competing explanations for how sports stars get paid. Let's look at the MRP explanation of input payment. After all, sports talent is just an input to the sports production process.

The Marginal Revenue Product Explanation

In almost all spheres of economic endeavor, payments to inputs, such as sports talent, are determined by the inputs' **marginal revenue product,** or MRP for short. Remember from Chapter 4 that talent is hired to produce winning percent in the long run. Given that, *MRP* for sports talent is defined as follows:

$$MRP(W) = MP(W) \times MR(W)$$

W is the level of team winning percent. *MP*(*W*) is marginal product, or the player's contribution to winning percent. For example, from Table 4.6, a team currently with five stars and a winning percent of 0.528 could raise its winning percent by 0.070 to 0.598 by adding another star. *MR*(*W*) is the marginal revenue generated by the player's contribution to winning. Again, revenue at the margin will depend on the level of winning percent that is being added to the level *W*. In sports, where market power leads to downward sloping demand functions, *MR* decreases with output. Therefore, the MR function slopes down for the individual team at any level of *W* that might be chosen in the long run. But what does MRP represent? Essentially, MRP is the input's contribution to the revenues earned by the team owner. In Chapter 4, you calculated the hypothetical cost of winning in Table 4.7. MRP is the other side of the comparison. This is the essential decision made by all producers: Discover the cost of winning and compare it to those players' MRP in order to determine whether they are worth hiring.

One of the major contributions of sports economics is the actual calculation of MRP. Once again, we return to one of the true pioneers in sports economics, Gerald Scully. In Chapter 4, we discussed his contribution to the analysis of coaches and managers. Scully (1974) also devised a way to calculate the value of a baseball player's MRP in his "Pay and Performance in Major League Baseball." In a nutshell, Scully's approach to MRP was to note that (1) playing statistics are used by managers to create wins, (2) each player has a bundle of different playing statistics that can be valued in terms of contributions to winning, and (3) wins are sold to fans. Simple multiplication then yields a player's MRP.

In more detail, Scully's first step is to estimate the contribution of measured player *statistics* in the production of wins. The relationship for a given team is as follows:

$$Wins = f(H, P; W)$$

Wins are the objective and depend on H = hitter performance and P = pitcher performance, holding W = winning percent (team quality) constant. W must be held constant since marginal impacts of improved team performance are different for stronger teams than for weaker teams (Chapter 4). Further, while Scully used a variety of measures of H and P, we will stick to just one for each type of player for easier presentation. Assuming a simple linear relationship

gives $Wins = a + b_1H + b_2P + b_3W$. Under this simple relationship, b_l is the definition of $\Delta Wins/\Delta H$ for hitters and b_2 is the definition of $\Delta Wins/\Delta P$. For example, for hitters, better slugging average should increase wins so that one expects $b_1 > 0$. For pitchers, a higher power-pitching ratio like strike outs divided by walks should increase wins so that one expects $b_2 > 0$ as well. Scully used multiple regression techniques to obtain estimates of b_1 and b_2. To keep them separate, let's label estimates as b_1^* and b_2^*.

Scully's next step is to find the contribution to winning by a *player,* rather than by player *statistics.* Scully multiplied individual player statistics by their marginal impact on winning. If a given hitter had hitter performance statistic H, then the MP of that player (rather than the statistic itself) is $b_1^* \times H$. But this is just the *player's* contribution to team wins. Since quality is held constant, this is the definition of the player's MP. Thus, for hitters, $b_1^* \times H = MP(W)$. Similarly, for pitchers, $b_2^* \times P = MP(W)$.

Since $MRP = MP(W) \times MR(W)$, and the previous steps determine $MP(W)$, Scully's last step was to determine $MR(W)$. From Chapter 2, revenues follow from careful assessment of demand. Generally, according to the determinants of demand, revenues are

$$R = R(T, I, S, E; Wins)$$

where R = revenues, T = ticket price, I = income, S = a measure of available substitutes, E = a proxy for expectations and, of main interest, Wins. A simple linear relationship is $R = \alpha + \beta_1T + \beta_2I + \beta_3S + \beta_4E + \beta_5Wins$. While the rest of the results are also of interest, focusing on the task at hand, the important definition is $\beta_5 = \Delta R/\Delta Wins$, the MR from winning. Thus the estimate of β_5, β_5^*, is $MR(W)$. Multiplying the preceding results by this estimate then gives MRP, that is $\beta_5^* \times b_1^* \times H = MRP(W)$ for hitters and $\beta_5^* \times b_2^* \times P = MRP(W)$ for pitchers.

Later, in *The Business of Major League Baseball* (1989), Scully shows that a one-point increase in winning percent raised 1984 revenues by $31,696 ($65,039). Because a win is 6.2 winning percent points, a win in 1984 was worth $196,515 ($403,242). A solid slugger would add 63 points, or about 11 wins. The MR from just those games in 1984 was worth $2.2 million ($4.4 million). A strong pitcher can add 20 net wins, or $3.9 million ($8.1 million) in extra revenue to an owner holding everything else about the team constant. These are precisely the elements that determine the MRP of players.

In a **competitive talent market,** we expect that players get paid pretty close to their MRP. In all pro sports leagues, rules agreed upon by owners and players through collective bargaining (covered in Chapter 9) allow players to sell their services to the highest bidder after a fixed number of years. In MLB, for example, it is six years. After that period, players are **free agents,** and they can sell their services to the highest bidder. The NHL has the most cumbersome formula for free agency, where free agency is determined both by experience and age. Of course, players become free agents only if they are not bound by a long-term contract to their current team. In this free-agency setting, we would expect players to play where they will be the happiest. Most often, this is the place where they will be paid the most.

Did You Know?
Economist Gerald Scully (1989) has estimated that a strong (but not superstar) MLB slugger, just for his power contribution, adds about $4.4 million (in 2009 dollars) to team revenues each year. A strong (but not superstar) pitcher can add around $8.1 million.

In order to get players to move from their current team, an owner will have to offer more than they make with that team. If competition over the player is brisk, then the eventual payment will be between the highest- and second-highest offer of the two top-bidding owners. Of course, competition works on both sides of the market. If good substitutes exist for any given player's services, one would expect this competition to dampen the size of the payment that would entice the player to

change teams. Even though this amount will not be quite the entire MRP at the highest-valued location, it will be between that value and the second-highest value across the entire league.

If you have caught on to the MRP idea, then you can answer one of the questions posed in the last section. Why do NBA players make more than, say, NFL players? If you answer that it is so because NBA players play about 90 games (including the preseason) whereas NFL players play about 18 games (including the preseason), you need to think again. The MLB season is twice as long as the NBA season, but MLB players earn less than NBA players, as shown in Table 7.2.

According to the MRP theory of player pay, it must be either because an NBA player has higher MP on a basketball team than an NFL player has on a football team or because NBA fans are willing to pay more for added winning so that MR is higher or both. Both explanations do seem reasonable. With a smaller number of players on NBA teams than on NFL teams, it is possible that the contribution to team winning is larger for each individual NBA player than for each individual NFL player. The MR collected by NBA owners also may be larger if the demand by NBA fans is greater. The MRP deck seems stacked in favor of a given NBA player earning more than a given NFL player.

Case Study: The Barry Bonds Show, 2001

In 2001, Barry Bonds of the San Francisco Giants was paid $10.3 million ($12.4 million). He was the 22nd highest-paid player in the league, in the top 3 percent. That year, Bonds hit 73 home runs, eclipsing the single-season home run record of 70 held by Mark McGwire. Bonds' record chase didn't seem to draw the same press enthusiasm as the earlier run by McGwire in 1998, but fans around the league were interested, especially in San Francisco—and to the tune of quite a few million dollars for the owner of the Giants.

Did You Know?
During Barry Bonds' pursuit of the single-season home run record in 2001, San Francisco attendance increased by around 1.2 million fans. This generated a revenue increase for the Giants' owners of between $23.7 million and $50.5 million. Bonds was paid $10.3 million that year.

It's pretty easy to see that Bonds' record chase was worth about the same amount to the Giants' owner as winning the division and considerably more than Bonds was actually paid. In 1999, the Giants finished second in the National League West Division and drew 2,078,365 at the gate. In 2000, the team won their division, and attendance increased to 3,315,330. In 2001, Bonds' record-breaking season, the Giants again finished second but still drew 3,311,958. When the Giants won their division, they enjoyed an attendance increment of 1,236,965. Suppose that the Giants would still have drawn 2,078,365 finishing second in 2001 without Bonds' record. If so, then Bonds' record-breaking performance added 1,233,603 fans. In their "Fan Cost Index" resource, Team Marketing Report (www.teammarketing.com) lists the Giants' average ticket price in 2001 at $19.24 ($23.17). The fan cost index itself is given as $163.89 ($197.41) for two adults and two kids. The additional attendance was worth conservatively $23.7 million ($28.6 million), just multiplying the average ticket price by the attendance increment. But the value could have been upward of $50.5 million ($60.8 million), dividing the increment by four and multiplying by the Fan Cost Index.

Here's the kicker: Because seasons like this do not come along even once in a lifetime, it is unlikely that the owners of the Giants had built the record chase into Bonds' contract to cover 2001. This means that Bonds' contribution to these unexpected revenues was over and above what the owners of the Giants thought he probably would be worth, on average, for the 2001 season, and we haven't included any revenues beyond those at the stadium. This bonus to the owners makes it clear that Bonds was worth his $10.3 million ($12.4 million), and then some in 2001.